ENGINE TEST FACILITY
Propulsion Development Test Cell J-2

J-2, located at Arnold Engineering Development Center, Arnold Air Force Base, Tennessee, is an altitude test cell used to perform turbojet, turbofan, turboshaft, ramjet, aerodynamic models, or combined aerodynamic inlet and propulsion system tests. Fixed Mach Number Free Jet, or Direct-Connect tests of air-breathing propulsion systems to a simulated Mach number of 3.0 can be tested. It is primarily used for Direct-connect performance and stability testing of large air-breathing-type propulsion systems. In addition, the basic capabilities exist within the J-2 test cell for free-jet testing on inlets, engines, or other aerodynamic shapes; icing and anti-icing investigations; and test article cold-soak evaluations (engine starts, component tests).

PROPULSION DEVELOPMENT TEST CELL J-2

Test Cell Dimensions:
Length: 67.3 ft
Diameter: 20 ft
Inlet Plenum Diameter: 8 ft

Environmental Capabilities:
Altitude (ft): Sea Level to 80,000
Total pressure (psia): up to 120
at the air inlet to the test cell
Total Temperature (°F): -65 to 650
Airflow (lb/sec): 0 to 1400
Installed Thrust Stand Capacity (lbs): 50,000

Soak Capabilities:
Maximum Temperature (°F): 650
Minimum Temperature (°F): -65

Power Absorption:
Water Brake has a maximum load of 600 HP and a minimum load of 0 HP.

Data Processing Capabilities:
ETF data processing capabilities provide pre-test, test, and post-test data reduction and analysis. General programs are available for processing data acquired by the digital data acquisition system. These programs calculate calibration factors, convert raw data to engineering units, calculate performance analysis parameters, generate hard copy tabulations and plots, provide interactive alphanumeric and graphics displays, and supply inputs for special-purpose processing programs. New programs may be developed as needed to meet specific test-unique data reduction and analysis requirements. In addition to real-time displays, data available for analysis/review during testing include all steady-state condition parameters and selected portions of time-dependent parameters. General data reduction programs are available for off-line processing of data recorded in the form of frequency-analog signals.

Unique Features:
- Equipment exists (conditioning box for missiles) for this cell to perform hot/cold soaks.
- Bulk head can be changed out to accommodate a rectangular nozzle with variability.
- Venturi throat area may be remotely varied by approximately 1000 square inches (in 80 square inch increments). Due to the number of venturis, there is more flow capacity at a given pressure in this cell as compared to J-1.
- The J-2 Force Measurement System (FMS) has multi-component (5 degrees of freedom) capability for measurement of axial, side and vertical forces and pitch and roll moments. The six-axis thrust stand is capable of measuring 50,000-pound axial force, 20,000-pound vertical force, and 15,000-pound side force loads.
- An icing system that utilizes up to 96 atomizing spray nozzles is available for installation in the 8 foot diameter inlet air plenum.

INSTRUMENTATION CAPABILITIES:

Steady State	**Temperature**	**Pressure**
Number of Channels:	536+	512+
Range:	-300 to 3000°F	5 to 600 psia/Varies
Sampling Rate	-------20+ samples/sec/channel-------	

Transient	**Temperature**	**Pressure**	**Vibrations**
Number of Channels:	536+	200+	18+
Range	-300 to 3000 °F	Varies	Varies
Sampling Rate:	-------200+ samples/sec/channel-------		

For more information about the Test Facility - Propulsion Development Test Cell J-2 at Arnold Engineering Development Center, Arnold Air Force Base, TN, contact 615-454-5851.